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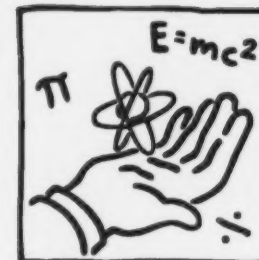
ABSTRACT

Studies conducted by American College Testing (ACT) researchers have consistently shown that preparation and subsequent achievement are tied directly to a solid high school program consisting of 4 years of English and at least 3 years of coursework in mathematics beyond general mathematics, high school science, and social studies. This document contains a condensed summary of results for the ACT-tested public school graduating class of 1994. Among the findings were these: (1) Students who plan to major in a science-related field and who complete at least 3 years of science and mathematics coursework score significantly higher on the ACT Mathematics and Science Reasoning tests than those who do not; (2) Only 8% of the females tested plan to major in science, whereas 22% of the males plan to; (3) As a percentage of students aspiring to major in science, within each racial/ethnic group by gender, African-American males and females are second only to Asian-American males and females. The document contains 11 tables detailing the data for this summary. (MKR)

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Are Our High School Graduates Prepared in Mathematics and Science?

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ACT

Studies conducted by ACT researchers have consistently shown that preparation and subsequent achievement is tied directly to a solid high school program consisting of four years of English and at least three years of coursework in mathematics beyond general mathematics, at least three years of high school science, and at least three years of social studies courses.

Recent studies, conducted at ACT and involving several dozen universities, of students who have taken the ACT Assessment and have completed mathematics and science coursework at these institutions provide a basis to monitor and measure the potential success of students in these courses tied directly to their high school preparation and ACT test results in Mathematics and Science Reasoning.

The following condensed summary of results for the nation's ACT-tested public school graduating class of 1994 (refer to Tables 1 through 11) highlights critical information pertaining to students planning on majoring in a science-related field in college, as well as those students who do not plan on science as a career, related to their high school preparation, ACT Mathematics and Science Reasoning test results, and probability of success in several university mathematics and science courses.

— Summary Highlights —

- 756,104 1994 public high school graduates and 93,815 parochial and private high school graduates took the ACT Assessment.
- Of the 756,104 ACT-tested public high school graduates, 103,322 (14%) reported that they plan to major in a science field in college. Thirty-two percent (33,471) of the prospective science majors were female. Of this number of prospective female science majors, 22,275 (67%) were Caucasian-American. (Please refer to Table 9.)
- Approximately 5% (34,895) of the total number of 1994 ACT-tested public high school graduates did not declare a college major.
- Of the 103,322 prospective science majors, 84,619 (82%) have taken at least three years of mathematics and science coursework in high school. Nearly 18% (18,703) who plan on majoring in science did not take three years of science and mathematics courses in high school; of this number 64% (11,951) were Caucasian-American students and 18% (3351) were African-American students. (Please refer to Table 9.) Last year, 72% of the prospective science majors completed the science/mathematics high school core.

- Students who are planning to major in science and who have completed at least three years of science and mathematics coursework achieve at a significantly higher level on the ACT Mathematics and Science Reasoning tests and have a significantly higher chance of success in college mathematics and science coursework than those students who did not take the core coursework in mathematics and science. (Please refer to Table 1, 2, and 3.)
- A total of 617,887 (82%) ACT-tested public school graduates reported that they do not plan on majoring in science in college. Of that number, 404,893 (66%) students completed at least three years of mathematics and science courses in high school and achieved significantly higher than the 212,994 (34%) students who did not complete a "core" sequence in mathematics and science. (Please refer to Tables 4, 5, and 6.)
- All students completing a "core" high-school mathematics and science sequence (for both science and non-science majors) have average ACT Mathematics and Science Reasoning scores that are consistently and significantly higher than their counterparts who did not complete a high school "core" sequence (compare Table 1 to Table 2, and Table 4 to Table 5) across all racial and ethnic groups. Likewise, the core completers have a consistent and significantly higher chance of performing at a 'B' or higher level in related courses at the postsecondary level.
- Eight percent (33,471) of the 406,738 ACT-tested female public school graduates plan to major in science. Of that 8%, 6,090 (18%) did not complete at least three years of mathematics and science courses in high school. (Please refer to Table 9.)
- Twenty-two percent (69,851) of the 314,471 ACT-tested male public school graduates plan to major in science. Of those male students declaring a science major, 12,613 (18%) did not complete at least three years of mathematics and science courses in high school. (Please refer to Table 9.)
- Females, across all race/ethnic groups, who plan to major in science and who completed three years of mathematics and science courses in high school scored significantly higher on the ACT Mathematics and Science Reasoning tests than their counterparts. In addition, this group of females scored significantly higher than male students, across all race/ethnic groups, who planned to major in science and did not complete the high school core mathematics and science courses, as well as males who did complete core and did not declare science as a major. (Please refer to Tables 3, 6, 7, and 8.)
- As a percentage of students aspiring to major in science, within each racial/ethnic group by gender, African-American males and females are second only to Asian-American males and females. Female and male Caucasian-American students have the lowest percentage of students planning to pursue a science degree. (Please refer to Table 11.)
- Female and male Asian-American public school graduates who declared a college science major had the highest average ACT Mathematics score of all gender/ethnic groups. Female Asian-Americans, whether they completed core or not, had a higher

average ACT Mathematics score than Caucasian-American males! A similar pattern is true for the non-science major Asian-Americans. (Please refer to Tables 7 and 8.)

- Female and male African-American public school graduates who declared a college science major and completed the high school mathematics and science core sequence outperformed their counterparts who did not complete core and indicated science as a major field of study, as well as their non-science major counterparts whether they completed core or not. However, African-American students are still the lowest achieving group of students. (Please refer to Tables 7 and 8.)

— Conclusions —

Although student motivation, desire to learn, quality of teaching, parental support, and a variety of other factors play a crucial role in enhancing the potential of a successful collegiate experience, for all high school students planning to pursue a post secondary education, a rigorous academic high school program of studies remains a significant precondition to insuring success. It is not only crucial for those students who plan to major in science to take the appropriate high school mathematics and science course work, but equally important for students not intending to pursue a career in science because of the role mathematics and science plays in many fields of study.

It is clear from this report that public high school graduates who are planning to pursue a science major and have completed at least three years of rigorous high school science and mathematics course work are better prepared to succeed in college than their counterparts. Of the prospective science majors 82% completed a core program in high school; 18% did not, thus limiting their chances of success! Only 66% of the nonscience majors completed a core mathematics and science sequence in high school, and this group of ACT-tested public high school graduates far exceeds the number of science majors by a margin of 6 to 1.

As a group, Asian-American students have the highest percentage of students completing the core requirements in science and mathematics, whether they plan on majoring in science or not, 89% and 81% respectively. African-American and Mexican-American students have the lowest percentage of students completing core in science and mathematics in high school for both science and nonscience majors.

More men than women continue to plan on science as a major in college by a ratio of 2 to 1, and caucasian males and females still represent the largest **number** of science majors by gender. However, as a percentage of students aspiring to major in science, within each race/ethnic category by gender, African-American males and females are second only to Asian-American males and females. Caucasian Americans have the lowest overall percent of males and females planning to pursue a science degree.

Asian-American males and females, whether they have declared science as a major or not, have the highest average ACT mathematics test scores of all groups of students. In fact Asian-American females have a higher average ACT mathematics score than caucasian males! African-American males and females, whether planning to pursue a college science major or not, regardless of whether or not they completed the high school core sequence in mathematics and science, continue to have the lowest average ACT score in mathematics and science.

Each year, approximately 1,500,000 high school junior and senior students take the ACT Assessment in preparation to attend colleges and universities across the United States. The ACT Assessment, developed by American College Testing—ACT—in Iowa City, Iowa, is a curriculum-based achievement test designed to assess the critical reasoning and higher order thinking skills in four core subject areas: Mathematics, English, Science Reasoning, and Reading. These tests not only reflect the acquired skills and levels of achievement of students as a product of their high school learning and instruction, but also serve as a critical measure of students' preparation to undertake rigorous and demanding coursework at the postsecondary level.

Table 1
High School Graduating Class of 1994
Public School Graduates Who Have Taken Three or More Years of Math and Science
Courses and Plan to Major in Science in College

Race/Ethnicity	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
American Indian/Alaskan Native	1,013	21.2	21.6	38	20	40
Asian American/Pacific Islander	4,189	25.6	23.2	72	52	53
African American/Black	9,117	19.1	19.0	21	8	16
Mexican American/Chicano	2,938	21.5	21.0	40	20	34
Puerto Rican/Cuban/Other Hispanic	1,523	22.3	21.6	47	26	39
Caucasian American/White	61,337	24.3	24.7	64	41	66
All*	84,619	23.6	23.7	58	36	58

* Includes persons not indicating race and persons designating race as "Other."

† The ACT scale score range is from 1 to 36.

Table 2
National Graduating Class of 1994
Public School Graduates Planning to Major in Science in College
Who Have Taken Less than Three Years of Math and Science in High School

Race/Ethnicity	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
American Indian/Alaskan Native	436	16.7	17.7	7	3	9
Asian American/Pacific Islander	508	21.2	19.0	37	23	19
African American/Black	3,351	15.7	16.5	3	1	4
Mexican American/Chicano	1,073	17.3	17.8	9	3	10
Puerto Rican/Cuban/Other Hispanic	405	17.6	18.0	12	6	11
Caucasian American/White	11,951	19.0	20.5	19	9	29
All*	18,703	18.2	19.4	16	7	22

* Includes persons not indicating race and persons designating race as "Other."

† The ACT scale score range is from 1 to 36.

Table 3
National Graduating Class of 1994
Public School Graduates Planning to Major in Science in College
Who Have Taken Three or More Years of Math and Science in High School

Gender	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
Female	27,381	22.8	22.8	52	31	51
Male	57,238	24.0	24.1	61	39	61
All	84,619	23.6	23.7	58	36	58

National Graduating Class of 1994
Public School Graduates Planning to Major in Science in College
Who Have Taken Less than Three Years of Math and Science in High School

Gender	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
Female	6,090	17.9	19.0	15	7	19
Male	12,613	18.4	19.5	16	8	23
All	18,703	18.2	19.4	16	7	22

† The ACT scale score range is from 1 to 36.

Table 4
National Graduating Class of 1994
Public School Graduates Not Planning to Major in Science in College
Who Have Taken Three or More Years of Math and Science in High School

Race/Ethnicity	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
American Indian/Alaskan Native	4,187	19.2	20.1	20	8	26
Asian American/Pacific Islander	13,998	23.3	21.7	54	34	40
African American/Black	34,521	17.4	17.9	9	3	9
Mexican American/Chicano	12,317	19.2	19.4	20	8	20
Puerto Rican/Cuban/Other Hispanic	6,187	19.8	19.9	25	10	23
Caucasian American/White	304,757	21.5	22.3	39	19	45
All*	404,893	21.1	21.7	36	17	40

* Includes persons not indicating race and persons designating race as "Other."

† The ACT scale score range is from 1 to 36.

Table 5
National Graduating Class of 1994
Public School Graduates Not Planning to Major in Science in College
Who Have Taken Less than Three Years of Math and Science in High School

Race/Ethnicity	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
American Indian/Alaskan Native	3,830	16.2	17.7	4	1	9
Asian American/Pacific Islander	3,246	18.9	18.6	20	10	16
African American/Black	23,125	15.2	16.2	2	0.4	2
Mexican American/Chicano	9,194	16.5	17.3	5	1	6
Puerto Rican/Cuban/Other Hispanic	3,408	16.5	17.4	5	2	8
Caucasian American/White	154,366	17.6	19.3	10	3	18
All*	212,994	17.3	18.7	9	3	15

* Includes persons not indicating race and persons designating race as "Other."

† The ACT scale score range is from 1 to 36.

Table 6
National Graduating Class of 1994
Public School Graduates Not Planning to Major in Science in College
Who Have Taken Three or More Years of Math and Science in High School

Gender	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
Female	244,324	20.6	21.2	32	15	36
Male	160,569	21.7	22.4	41	21	47
All	404,893	21.1	21.7	36	17	40

National Graduating Class of 1994
Public School Graduates Not Planning to Major in Science in College
Who Have Taken Less than Three Years of Math and Science in High School

Gender	N	Average ACT Scores		Percent of Students with a 50/50 Chance of Receiving a B or Better in College Courses		
		Mathematics†	Science Reasoning†	College Algebra	Calculus	Chemistry
Female	128,943	17.1	18.6	9	3	14
Male	84,051	17.4	18.9	9	3	17
All	212,994	17.3	18.7	9	3	15

† The ACT scale score range is from 1 to 36.

Table 7
National Graduating Class of 1994
Public School Graduates Planning to Major in Science in College

Race/Ethnicity	Core Completers Average ACT Scores				Non-Core Completers Average ACT Scores			
	Mathematics†		Science Reasoning†		Mathematics†		Science Reasoning†	
	Female	Male	Female	Male	Female	Male	Female	Male
American Indian/ Alaskan Native	20.8 (363)*	21.5 (650)	21.1 (363)	21.9 (650)	16.4 (151)	16.8 (285)	17.2 (151)	18.0 (285)
Asian American/ Pacific Islander	25.6 (1361)	25.6 (2828)	23.1 (1361)	23.2 (2828)	21.4 (160)	21.1 (348)	19.1 (160)	18.9 (348)
African American/ Black	19.0 (3900)	19.1 (5217)	18.8 (3900)	19.1 (5217)	15.6 (1257)	15.7 (2094)	16.4 (1257)	16.6 (2094)
Mexican American/ Chicano	21.0 (1010)	21.8 (1928)	20.3 (1010)	21.3 (1928)	16.9 (378)	17.6 (695)	17.4 (378)	18.1 (695)
Puerto Rican/Cuban Other Hispanic	21.4 (554)	22.8 (969)	21.0 (554)	22.0 (969)	17.2 (142)	17.9 (263)	17.7 (142)	18.1 (263)
Caucasian American/White	23.5 (18,605)	24.6 (42,732)	23.9 (18,605)	25.0 (42,732)	18.7 (3670)	19.1 (8291)	20.3 (3670)	20.6 (8291)

* Numbers in parentheses represent the student count.

† The ACT scale score range is from 1 to 36.

Table 8
National Graduating Class of 1994
Public School Graduates Not Planning to Major in Science in College

Race/Ethnicity	Core Completers Average ACT Scores				Non-Core Completers Average ACT Scores			
	Mathematics†		Science Reasoning†		Mathematics†		Science Reasoning†	
	Female	Male	Female	Male	Female	Male	Female	Male
American Indian/ Alaskan Native	18.8 (2495)	19.7 (1692)	19.8 (2495)	20.5 (1692)	16.0 (2262)	16.4 (1568)	17.5 (2262)	17.9 (1568)
Asian American/ Pacific Islander	22.9 (8541)	23.8 (5457)	21.3 (8541)	22.4 (5457)	18.8 (2005)	18.9 (1241)	18.5 (2005)	18.8 (1241)
African American/ Black	17.4 (23,396)	17.6 (11,125)	17.8 (23,396)	18.1 (11,125)	15.1 (13,946)	15.3 (9179)	16.2 (13,946)	16.3 (9179)
Mexican American/ Chicano	18.8 (7522)	19.8 (4795)	19.0 (7522)	20.1 (4795)	15.3 (5598)	16.7 (3596)	17.2 (5598)	17.5 (3596)
Puerto Rican/Cuban Other Hispanic	19.4 (4100)	20.6 (2087)	19.4 (4100)	20.7 (2087)	16.4 (2213)	16.7 (1195)	17.3 (2213)	17.7 (1195)
Caucasian American/White	21.1 (182,157)	22.1 (122,600)	21.8 (122,600)	23.0 (122,600)	17.5 (93,945)	17.8 (60,421)	19.1 (93,943)	19.5 (60,421)

* Numbers in parentheses represent the student count.

† The ACT scale score range is from 1 to 36.

Table 9
National Graduating Class of 1994
Public School Graduates Planning to Major in Science in College

Race/Ethnicity	Core Completers Percent of Students by Gender			Non-Core Completers Percent of Students by Gender			Row Totals
	Female	Male	Row Subtotal	Female	Male	Row Subtotal	
American Indian/ Alaskan Native	363 (1%)*	650 (1%)	1013 (1%)	151 (2%)	285 (2%)	436 (2%)	1449 (1%)
Asian American/ Pacific Islander	1361 (5%)	2828 (5%)	4189 (5%)	160 (3%)	348 (3%)	508 (3%)	4697 (5%)
African American/ Black	3900 (14%)	5217 (9%)	9117 (11%)	1257 (21%)	2094 (17%)	3351 (18%)	12,468 (12%)
Mexican American/ Chicano	1010 (4%)	1928 (3%)	2938 (3%)	378 (6%)	695 (6%)	1073 (6%)	4011 (4%)
Puerto Rican/Cuban Other Hispanic	554 (2%)	969 (2%)	1523 (2%)	142 (2%)	263 (2%)	405 (2%)	1928 (2%)
Caucasian American/White	18,605 (68%)	42,732 (75%)	61,337 (72%)	3670 (60%)	8281 (66%)	11,951 (64%)	73,288 (71%)
Other/ Non-Response	1588 (6%)	2914 (5%)	4502 (5%)	332 (6%)	647 (5%)	979 (5%)	5481 (5%)
Column Totals	27,381	57,238	84,619 (82%)†	6090	12,613	18,703 (18%)†	103,322

* Percentages appearing in parentheses are column percents

† Percent of total

Table 10
National Graduating Class of 1994
Public School Graduates Not Planning to Major in Science in College

Race/Ethnicity	Core Completers Percent of Students by Gender			Non-Core Completers Percent of Students by Gender			Row Totals
	Female	Male	Row Subtotal	Female	Male	Row Subtotal	
American Indian/ Alaskan Native	2495 (1%)*	1692 (1%)	4187 (1%)	2262 (2%)	1568 (2%)	3830 (2%)	8017 (1%)
Asian American/ Pacific Islander	8541 (3%)	5457 (3%)	13,998 (3%)	2005 (2%)	1241 (1%)	3246 (2%)	17,244 (3%)
African American/ Black	23,396 (10%)	11,125 (7%)	34,521 (9%)	13,946 (11%)	9179 (11%)	23,125 (11%)	57,646 (9%)
Mexican American/ Chicano	7522 (3%)	4795 (3%)	12,317 (3%)	5598 (4%)	3596 (4%)	9194 (4%)	21,511 (3%)
Puerto Rican/Cuban Other Hispanic	4100 (2%)	2087 (1%)	6187 (2%)	2213 (2%)	1195 (1%)	3408 (2%)	9595 (2%)
Caucasian American/White	182,157 (75%)	122,600 (76%)	304,757 (75%)	93,945 (73%)	60,421 (72%)	154,366 (72%)	459,123 (74%)
Other/ Non-Response	16,113 (7%)	12,813 (8%)	28,926 (7%)	8974 (7%)	6851 (8%)	15,825 (7%)	44,751 (7%)
Column Totals	244,624	160,569	404,893 (66%)†	128,943	84,051	212,994 (34%)†	617,887

* Percentages appearing in parentheses are column percents

† Percent of total

Table 11
National Graduating Class of 1994
Percent of Total ACT-tested Public School Graduates
Planning to Major in Science by Race/Ethnicity and Gender

Race/Ethnicity	Males		Females		Total	
	N	%*	N	%*	Males	Females
American Indian/ Alaskan Native	935	22.3	514	9.8	4195	5271
Asian American/ Pacific Islander	3176	32.2	1521	12.6	9874	12,067
African American/ Black	7311	26.5	5157	12.1	27,615	42,499
Mexican American/ Chicano	2623	23.8	1388	9.6	11,014	14,508
Puerto Rican/Cuban/ Other Hispanic	1232	27.3	696	9.9	4514	7009
Caucasian American/ White	51,023	21.8	22,275	7.5	234,034	298,387

* Percentages are calculated within each race/ethnic group separately for males and females